

CLAIMS

What is claimed is:

1. A method for inhibiting or controlling inorganic scale formations in a subterranean formation or in a wellbore, comprising pumping downhole a copolymer
5 comprising:
 quaternary ammonium salt; and
 an acrylamide unit.
2. The method of Claim 1, wherein the quaternary ammonium salt is selected
10 from the group consisting of dialkyldiallylammonium salt, polyvinyl benzyl trialkyl ammonium salts, salts of polyepichlorohydrin quaternized with trialkyl amine, polymethacrylamidopropyltrialkyl ammonium salts, polymethacryloyloxyethyltrialkyl ammonium salts, and polymethacryloyloxyethyl dialkyl hydroxyalkyl ammonium salt.
- 15 3. The method of Claim 2, wherein the quaternary ammonium salt is a dialkyldiallylammonium salt.
4. The method of Claim 3, wherein the dialkyldiallylammonium salt is a dimethyldiallylammonium salt.
20
5. The method of Claim 4, wherein the dimethyldiallylammonium salt is dimethyldiallylammonium chloride.
6. The method of Claim 2, wherein the quaternary ammonium salt is a
25 polyvinyl benzyl trialkyl ammonium salt.
7. The method of Claim 6, wherein the polyvinyl benzyl trialkyl ammonium salt is polyvinyl benzyl trimethyl ammonium salt.

8. The method of Claim 1, wherein the acrylamide unit is acrylamide, (meth)acrylamide, diacetone acrylamide or N-methylolacrylamide.
9. The method of Claim 8, wherein the acrylamide unit is acrylamide.
- 5 10. The method of Claim 5, wherein the acrylamide unit is acrylamide.
11. The method of Claim 1, wherein the copolymer is pumped downhole as a component of a carrier fluid.
- 10 12. The method of Claim 1, wherein the copolymer is pumped downhole as part of a brine.
13. The method of Claim 12, wherein the brine contains calcium bromide, zinc bromide, calcium chloride or a combination thereof or sodium bromide.
- 15 14. The method of Claim 1, wherein the copolymer is pumped downhole as a component of a fracturing fluid.
- 15 15. The method of Claim 1, wherein the copolymer is pumped downhole as a component of an acidizing fluid.
- 20 16. The method of Claim 1, wherein the inorganic scale formations are zinc sulfide or iron sulfide scale formations.
- 25 17. The method of Claim 1, wherein the weight average molecular weight of the copolymer is between from about 500,000 to about 5,000,000.
18. The method of Claim 4, wherein the molar ratio of acrylamide unit:diallyldimethylammonium salt is between from about 1:5 to about 5:1.
- 30

19. The method of Claim 18, wherein the molar ratio of acrylamide unit:diallyldimethylammonium salt is from about 1:1 to about 3:1.

20. The method of Claim 1, wherein the copolymer further comprises an
5 acrylic acid unit.

21. The method of Claim 20, wherein the acrylic acid unit is acrylic acid, (meth)acrylic acid or a salt thereof.

10 22. The method of Claim 21, wherein the weight average molecular weight of the copolymer is between from about 500,000 to about 5,000,000.

23. The method of Claim 1, wherein the copolymer is a block or random
15 copolymer.

24. The method of Claim 23, wherein the copolymer is a block copolymer composed of blocks of polyacrylamide and polydiallyldimethylammonium salt and, optionally, blocks of polyacrylic acid or a sodium salt thereof.

20 25. The method of Claim 23, wherein the copolymer is a random copolymer composed of units of acrylamide and diallyldimethylammonium salt and, optionally, acrylic acid or a sodium salt thereof.

25 26. A completion fluid for use in an oil or gas well comprising a brine containing zinc bromide, calcium bromide, calcium chloride, or a combination thereof or sodium bromide and a copolymer comprising a quaternary ammonium salt and an acrylamide unit.

27. A method for inhibiting or controlling zinc sulfide or iron sulfide scale formations in an oil or gas well or in a wellbore, comprising pumping downhole a copolymer of an acrylamide unit and a diallyldimethylammonium salt and, optionally, acrylic acid or a salt thereof.

5

28. The method of Claim 27, wherein the copolymer is pumped downhole as a component of a carrier fluid.

29. The method of Claim 27, wherein the copolymer is pumped downhole as a
10 component of a brine.

30. The method of Claim 27, wherein the copolymer is pumped downhole as a component of a fracturing fluid.

31. The method of Claim 27, wherein the copolymer is pumped downhole as a
15 component of an acidizing fluid.

32. The method of Claim 27, wherein the copolymer is soluble in a brine having a density greater than or equal to 14.0 lb/gal.

20

33. A method for inhibiting or controlling zinc sulfide or iron sulfide scale formations in a subterranean formation or in a wellbore, comprising pumping downhole a composition having a density greater than or equal to 14.0 lb/gal., wherein the composition comprises brine and a copolymer comprising an acrylamide unit and
25 diallyldimethylammonium salt and, optionally, acrylic acid or a salt thereof, further wherein the copolymer is soluble in the brine.

34. The method of Claim 33, wherein the weight average molecular weight of the copolymer is between from about 500,000 to about 5,000,000.

30

35. The method of Claim 33, wherein the copolymer is a terpolymer of acrylamide, diallyldimethylammonium salt and acrylic acid or a salt thereof and further wherein the weight ratio of acrylamide:diallyldimethylammonium salt:acrylic acid is about 1:1:1.

5

36. A fluid for use in an oil or gas well comprising a copolymer comprising a quaternary ammonium salt and an acrylamide unit.

37. The fluid of Claim 36, wherein the quaternary ammonium salt is selected from the group consisting of dialkyldiallylammonium salt, polyvinyl benzyl trialkyl ammonium salts, salts of polyepichlorohydrin quaternized with trialkyl amine, polymethacrylamidopropyltrialkyl ammonium salts, polymethacryloyloxyethyltrialkyl ammonium salts, and polymethacryloyloxyethyl dialkyl hydroxyalkyl ammonium salt.

38. The fluid of Claim 37, wherein the quaternary ammonium salt is a dialkyldiallylammonium salt or a polyvinyl benzyl trialkyl ammonium salt.

39. The fluid of Claim 36, wherein the acrylamide unit is acrylamide.

40. The fluid of Claim 36, wherein the fluid further comprises a brine.

41. The fluid of Claim 40, wherein the brine contains calcium bromide, zinc bromide, calcium chloride or a combination thereof or sodium bromide.

42. The fluid of Claim 36, wherein the copolymer further comprises an acrylic acid unit.

43. The fluid of Claim 42, wherein the acrylic acid unit is acrylic acid, (meth)acrylic acid or a salt thereof.

30

44. The fluid of Claim 41, wherein the copolymer is a block or random copolymer composed of units of acrylamide and diallyldimethylammonium salt and, optionally, acrylic acid or a sodium salt thereof.